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10/676,581

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Gerolf F. Hoflehner

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03/20/2008

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EXAMINER

ARCOS, CAROLINE H

ART UNIT

PAPER NUMBER

2195

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/676,581

Applicant(s)

HOFLEHNER ET AL.

Examiner

CAROLINE ARCOS

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2195

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 01/24/2005
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. Claims 1-20 are pending for examination.

#### *Double Patenting*

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

3. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

4. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 4-8, 11-15 and 17-19 of copending Application No. 10/779193 in view of Mulder ("inter: An inexpensive inter-procedural register allocator" Micro processing and microprogramming, Elsevier Science Publishers, Vol. 27, 1998, Pages 95-100). Although the conflicting claims are not identical, they are not patentably distinct

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from each other because both systems comprise substantially the same elements. For example, claims 3, 15, 17 and 20 functions performed by the steps of the instant application are the same and obvious as the steps of claim 15 of copending application No. 10/779193. (the selecting, determining, and allocating in bottom-up order until each of one or more threads has been processed {claim 17}/ select a current thread by traversing the thread tree in a bottom-up order that ensure that all child threads of the current threads had been selected before selecting the current thread as a parent thread, determine resources allocated to one or more child threads spawned from the current thread{claim 15}/ determine resources allocated to one or more child threads spawned from the current thread, allocate resources for the current thread in consideration of the resources allocated to the current thread's one or more child threads to avoid resource conflicts between the current thread and its one or more child threads {claim 15}/allocate resources for the current thread in consideration of the resources allocated to the current thread's one or more child threads to avoid resource conflicts between the current thread and its one or more child threads, the resources include at least one of hardware registers and memory used by the respective thread {claim 20}/ the allocated resources include one or more hardware registers and physical memory associated with the processor used by each of the plurality of the threads, the resources allocated to the one or more child threads are recorded in a data structure accessible by the current thread{claim 3}, the resource allocated to one or more child threads are recorded in a data structure).

6. The instance doesn't state the resulting in a thread tree potentially for at least one function in the code, wherein the thread tree represents a thread dependency graph of the

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plurality of the threads, and that the resource allocated to the one or more child threads are recorded in a data structure is maintained by a compiler at the compilation to enable the compiler to avoid the resource conflicts between current thread and the one or more child threads such that the processor perform less resource management actions during executing the plurality of the threads by the processor.

7. However, Mulder teaches the resulting in a thread tree potentially for at least one function in the code, wherein the thread tree represents a thread dependency graph of the plurality of the threads (Fig. 9; pg. 98, section 6, lines 1-5; pg. 98, section 6.1, lines 1-10) and the resource allocated to the one or more child threads are recorded in a data structure is maintained by a compiler at the compilation to enable the compiler to avoid the resource conflicts between current thread and the one or more child threads such that the processor perform less resource management actions during executing the plurality of the threads by the processor (pg. 99, section 6.3, subsection: separate compilation, lines 7-14; pg. 99, section 6.3, subsection: dynamic compilation and linking, lines 1-11).

8. Mulder doesn't explicitly teach that the resource allocated to the one or more child threads are recorded in a data structure. However, it will be obvious to one of ordinary skill in the art at the time the invention was made to conclude from both instant application and Mulder teaching that interface files are type of data structure that is maintained by a compiler to allocate resource starting with the child thread and ending with the parent thread which improve system performance, system speed and eliminate system traffic.

***Claim Objections***

9. Claims 8-14 are objected to because of the following informalities:

a. As per claim 8, it is unclear whether it is a machine- readable medium claim or a method claims hence the claims are directed to non-statutory subject matter. The claims should be a method or machine readable medium claim. This is a possible 112 2nd issue.

b. As per claim 9-14, they are objected for similar reasons as discussed for their parent claims, as they fail to present any limitation that resolve the deficiencies of the claim from which they depend.

Appropriate correction is required.

***Claim Rejections - 35 USC § 101***

10. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

11. Claims 8-14 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

12. Claim 8 is not limited to statutory embodiments. In view of applicant's disclosure, specification par. [0028], line 2, the machine readable medium is being defined as including both statutory embodiments (e.g. ROM, RAM, magnetic disk storage media, optical storage media, flash memory devices) and non statutory embodiments (e.g. electrical, optical, acoustical, propagated signals,, carrier waves, infrared signals, digital signals). As such, the claim is not

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limited to statutory subject matter and is therefore non statutory. To overcome this type of rejection, the claims need to be amended to include only the physical computer medium (computer storage medium) and not a transmission medium or other non statutory or non functional medium.

13. Claims 9-14 are rejected for similar reasons as discussed for their parent claim, as they fail to present any limitations that resolve the deficiencies of the claim from which they depend.

***Claim Rejections - 35 USC § 112***

14. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

15. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- a. The claim language in the following claims is not clearly understood:
  - i. As per claim 1, line 3, it is unclear what is meant by “a current thread”? (i.e. ready to execute thread?). It is not clearly understood what is meant by “a most bottom order” (i.e. last to be executed or last on the queue of scheduled threads or the parent thread on the last tier of the thread tree ?). It is not clear bottom of what order? (i.e. thread tree order). Line 4, it is unclear what are the criterias and how the determination of resources allocated to one or more child threads is accomplished?

- ii. As per claim 2, line 2, it is unclear what is meant by “the respective thread”? (i.e. the current thread or child threads).
- iii. As per claims 8-9, it has the same deficiency as claims 1-2.
- iv. As per claim 15, line 4, it is unclear what are the criterias for causing the processor to select, determine, and allocate? Furthermore, the claim has the same deficiency as claim 1.
- v. As per claim 20, it has the same deficiency as claim 2.
- vi. As per claim 4, line 1-2, it is not clearly understood what are the criterias for updating the resources information allocated to the current thread?
- vii. As per claim 5, line 2, it is not clearly understood what is meant by “allocating in a bottom up order”? (i.e. from the leading thread of last tier in the thread tree).
- viii. As per claims 11-12, they have the same deficiency as claims 4-5.
- ix. As per claims 16-17, they have the same deficiency as claims 4-5.
- x. As per claim 7, line 2, it is unclear how “determining whether there are resources remaining “will be done? (i.e. check the data structure of the child threads). Line 4, it is unclear what are the criterias for “deleting at least one child of the current thread”? (i.e. insufficient resource for the current thread?).
- xi. As per claim 14, it has the same deficiency as claim 7.
- xii. As per claim 19, it has the same deficiency as claim 7.



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2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-6, 8-13 and 15-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulder ("inter: An inexpensive inter-procedural register allocator" Micro processing and microprogramming, Elsevier Science Publishers, Vol. 27, 1998, Pages 95-100).

4. Mulder ("inter: An inexpensive inter-procedural register allocator" Micro processing and microprogramming, Elsevier Science Publishers, Vol. 27, 1998, Pages 95-100) was submitted by applicant in IDS filed on 01/24/2005.

5. As per claim 1, Mulder teaches the invention substantially as claimed including a method, comprising:

selecting, during a compilation of code having one or more threads executable in a data processing system, a current thread having a most bottom order (pg.95, section 1.3, lines 7-9; pg. 98, section 6, lines 3-5) ;

determining resources allocated to one or more child threads spawned from the current thread (pg. 98, section 6, lines 3-6; pg.98, section 6.1, lines 2-4); and

allocating resources for the current thread in consideration of the resources allocated to the current thread's one or more child threads to avoid resource conflicts between the current thread and its one or more child threads (pg.98, section 6.1, lines 1-2; pg. 98, section 6.1, lines 5-

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10) .

6. Mulder doesn't explicitly teach the method of selecting, determining and allocating is done on threads, however, he teaches the method is to be done on inter procedure resource allocation. And since procedures are sequence of threads, it would be obvious to one of ordinary skill in the art at the time the invention was made to incorporate Mulder teaching of inter procedural resource allocation in inter thread resource allocation because Mulder teaching would improve system performance, reducing system traffic and eliminate resource allocation conflicts.

7. As per claim 2, Mulder teaches the resources include at least one of hardware registers and memory used by the respective thread (pg.98, section 6, lines 3-6).

8. As per claim 3, Mulder teaches the resources allocated to the one or more child threads are recorded, accessible by the current thread (pg.98, section 6.1, lines 5-10; pg. 99, section 6.3, subsection: separate compilation, lines 8-14).

9. Mulder doesn't explicitly teach one or more child threads are recorded in a data structure. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to conclude from Mulder teaching of passing register usage information of child threads on interface files would improve system performance by eliminating resource allocation conflicts.

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10. As per claim 4, Mulder teaches updating resource information regarding the resources allocated to the current thread, accessible by a parent thread of the current thread (pg. 98, section 6, lines 3-5; pg. 98, section 6.1, lines 1-6; pg. 99, section 6.3, subsection: separate compilation, lines 9-14).

11. Mulder doesn't explicitly teach updating resource information in a data structure. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to conclude from Mulder teaching of passing register usage information of current thread to parent thread on interface files is a data structure which would improve system performance by eliminating resource allocation conflicts.

12. As per claim 5, Mulder teaches repeating the selecting, determining, and allocating in a bottom-up order until each of the one or more threads has been processed (pg. 98, section 6, lines 3-5; pg. 98, section 6.1, lines 1-2).

13. As per claim 6, Mulder teaches allocate resources for a main thread that is a parent thread of the one or more threads after each of the one or more threads has been processed, the resources of the main thread are allocated in view of resources allocated to the one or more threads (pg.98, section 6.1, lines 1-2; pg. 98, section 6.1, lines 5-10).

14. As per claim 8, it is the machine-readable medium claim of the method claim 1. Therefore, it is rejected under the same rational as claim 1 since both claims have similar

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limitations.

15. As per claim 9, it is the machine-readable medium claim of the method claim 2.

Therefore, it is rejected under the same rational as claim 2 since both claims have similar limitations.

16. As per claim 10, it is the machine-readable medium claim of the method claim 3.

Therefore, it is rejected under the same rational as claim 3 since both claims have similar limitations.

17. As per claim 11, it is the machine-readable medium claim of the method claim 4.

Therefore, it is rejected under the same rational as claim 4 since both claims have similar limitations.

18. As per claim 12, it is the machine-readable medium claim of the method claim 5.

Therefore, it is rejected under the same rational as claim 5 since both claims have similar limitations.

19. As per claim 13, it is the machine-readable medium claim of the method claim 6.

Therefore, it is rejected under the same rational as claim 6 since both claims have similar limitations.

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20. As per claim 15, A data processing system, comprising: a processor capable of performing multi-threading operations; a memory coupled to the processor (pg. 95, section 1.1, lines 1-4); and a process executed by the processor from the memory to cause the processor to select, during a compilation of code having one or more threads executable in a data processing system, a current thread having a most bottom order (pg.95, section 1.3, lines 7-9; pg. 98, section 6, lines 3-5) ;

determine resources allocated to one or more child threads spawned from the current thread (pg. 98, section 6, lines 3-6; pg.98, section 6.1, lines 2-4); and

allocate resources for the current thread in consideration of the resources allocated to the current thread's one or more child threads to avoid resource conflicts between the current thread and its one or more child threads (pg.98, section 6.1, lines 1-2; pg. 98, section 6.1, lines 5-10) .

21. Mulder doesn't explicitly teach the method of selecting, determining and allocating is done on threads, however, he teaches the method is to be done on inter procedure resource allocation. And since procedures are sequence of threads, it would be obvious to one of ordinary skill in the art at the time the invention was made to incorporate Mulder teaching of inter procedural resource allocation in inter thread resource allocation because Mulder teaching would improve system performance, reducing system traffic and eliminate resource allocation conflicts.

22. As per claim 16, it is the data processing system claim of the method claim 4. Therefore, it is rejected under the same rational as claim 4 since both claims have similar limitations.

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23. As per claim 17, it is the data processing system claim of the method claim 5. Therefore, it is rejected under the same rational as claim 5 since both claims have similar limitations.

24. As per claim 18, it is the data processing system claim of the method claim 6. Therefore, it is rejected under the same rational as claim 6 since both claims have similar limitations.

25. As per claim 20, it is the data processing system claim of the method claim 2. Therefore, it is rejected under the same rational as claim 2 since both claims have similar limitations.

26. Claims 7, 14 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulder ("inter: An inexpensive inter-procedural register allocator" Micro processing and microprogramming, Elsevier Science Publishers, Vol. 27, 1998, Pages 95-100), in view of Patterson (US 7,036,124 B1).

27. As per claim 7, Mulder doesn't explicitly teach determining whether there are resources remaining in the data processing system prior to the allocating the resources for the current thread; and deleting at least one child thread of the current thread; and allocating the resources for the current thread using the resources associated with the at least one deleted child thread.

28. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make use of Mulder's teaching of passing register information to the current thread to conclude that this information is used to determine what resources are used and what is remained available because determining available resources before allocation improve

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system efficiency and eliminate resource conflict.

29. Paterson teaches deleting at least one child thread of the current thread (abs., lines 8-10); and

allocating the resources for the current thread using the resources associated with the at least one deleted child thread (abs., lines 8-12). it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Mulder's and Paterson teachings because Patterson's teaching of deleting at least one child thread of the current thread; and allocating the resources for the current thread using the resources associated with the at least one deleted child thread will improve system performance and resource allocation techniques since allocating the child's resource to the parent for accomplishing a higher priority task.

30. As per claim 14, it is the machine-readable medium claim of the method claim 7. Therefore, it is rejected under the same rational as claim 7 since both claims have similar limitations.

31. As per claim 19, it is the data processing system claim of the method claim 7. Therefore, it is rejected under the same rational as claim 7 since both claims have similar limitations.

### ***Conclusion***

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32. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(US 6233599 B1) teaches retrofitting multi-threaded operations on a computer by partitioning and overlapping registers.

(US 7328242 B1) teaches multiple simultaneous threads of communication.

(US 20050165671 A1) teaches Online trading system and method supporting hierarchically-organized trading members

33. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CAROLINE ARCOS whose telephone number is (571)270-3151.

The examiner can normally be reached on Monday-Thursday 7:00 AM to 5:30 PM.

34. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on 571-272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

35. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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